Montana
Office of Public Instruction
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Science Model Teaching Unit
Tall Tales (Mechanical Weathering, Glacier Features, and Indigenous Mountain Names)

Grade 5 - Approximate Duration: 150 minutes

Stage 1 Desired Results

Established Goals

Science Content Standard 2—Students, through the inquiry process, demonstrate knowledge of properties, forms, changes and interactions of physical and chemical systems.

Science Content Standard 4—Students, through the inquiry process, demonstrate knowledge of the composition, structures, processes and interactions of Earth's systems and other objects in space.

Science Content Standard 5—Students, through the inquiry process, understand how scientific knowledge and technological developments impact communities, cultures and societies.

Essential Understanding 3: The ideologies of Native traditional beliefs and spirituality persist into modern day life as tribal cultures, and languages are still practiced by many American Indian people and are incorporated into how tribes govern and manage their affairs.

Additionally, each tribe has its own histories, which are as valid as written histories. These histories predate the "discovery" of North America.

Essential Understanding 6: History is a story most often related through the subjective experience of the teller. With the inclusion of more and varied voices, histories are being discovered and revised. History told from an Indian perspective frequently conflicts with the stories mainstream historians tell.

Understandings	Essential Questions
• **Mountain Indigenous Name:** pertaining to the feature of geological shape or glacial feature. • **Mechanical Weathering:** ice wedges, release pressure, chemical weathering, abrasions from wind, plant action. • **Glacial Feature**: Cirques (blue color code), u-shaped valley (green color code), snowfield (red color code), cirque glacier (orange color coded).	• On the east side of Glacier National Park, what mountains retain American Indian names? • What are the different types of mechanical weathering process? • What are the different types of glacial features? • How are those features different?

Indian Education
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Science Grade 5 Tall Tales (Mechanical Weathering, Glacier Features, and Indigenous Mountain Names) (continued)

Students will be able to…	*Students will know…*
• name at least two peaks in Glacier National Park. • understand the meaning of the Native name of the peaks in Glacier Park • create a model of a mountain with glacial feature. • demonstrate knowledge of erosion and past /present ice age remnants pertaining to geological features by response to questions and creating a model.	• the history/story of why the names appear on the peaks in Glacier National Park mountains. • how to identify a type of mechanical weathering and see the outcome of erosion. • what features exist within a mountain range due to the past ice age; explain what occurs in a glacial period.

Stage 2 Assessment Evidence

Performance Tasks

Students will be grouped in two person teams and work as teams to locate glacial features with the color code as followed

Cirques (blue color code)
U-shaped valley(green color code)
Snowfield (red color code)
Cirque glacier (orange color code)

Assessment will be based upon "The Creative Process in Art, Science and Native American Cultures." Each individual student will express his/her own outcomes on his/her mountain model.

Assessment of progress made by students in developing a working understanding of the creative thought process as demonstrated on mountain model and also the insight of other students' shared knowledge (Greg Cajete Ph. D. Igniting The Sparkle, pg. 195, 197). Refer to the rubric below.

Other Evidence

Students will be organized into small groups. Students review to share each other's knowledge received or perceived. This is an indigenous model assessment closely related to cooperative learning.

Assessment Rubric: Traditional Educational Knowledge. Understanding and skilled application of the creative/science/art thought process as demonstrated through completion and presentation of an appropriate project. The rubric is designed to evaluate in three stages. Level 1: Shows little or no evidence connecting to lesson. Level 2: perceives lesson but doesn't demonstrate the whole task. Level 3: grasps lessons and shows understanding.

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	Level 1, 70%-below	Level 2, 80% to 89%	Level 3, 90% to 100%
Introducing, exploring (discussion)	**Participant is unclear with objectives**	**Limited participant perception/interaction is evident**	**Participants are interacting with the objectives, Self meaning is apparent**
Explaining (information sharing)	**Participant is not engaged with principle concept**	**Some participants are engaged with principle concept**	**Demonstration of principle concept is evident**
Coaching (encouraging)	**Participants are not interacting with hands on exploration method**	**Participants are trying to connect to project**	**Participants show engagement with project**
Self explore (expression)	**Participant can't reflect experience from objective**	**Participants are trying to reflect /personalized experience from objectives**	**Participants are integrating with personal discoveries**

Stage 3 Learning Plan

Learning Activities: Students will develop their own model for visual learners, analyze a model for analytical intelligence, introspective from story told.

Day 1 - 45 min.
Read stories of mountains with names that have been given by Native peoples from *Place Names of Glacier National Park*, by Jack Holterman, Riverbend Publishing. Refer to excerpts for each of the following locations:

- **Red Eagle Mountain:** View an image of Red Eagle Mountain at: http://www.nps.gov/archive/glac/images/02025.jpg.
- **Chief Mountain:** View an image of Chief Mountain at: http://www.nps.gov/archive/glac/images/02818.jpg.

Day 2 - 45 min
Students will engage in a virtual tour of Glacier National Park

1. They will find mechanical weathering in photos from Web sites. Sites to use as a reference include:
   - www.nps.gov/archive/glac/home.htm
   - www.glacierparkphotos.com
2. Refer to the websites above to find pictures to point out each feature of mechanical weathering as follows:

Mechanical Weathering: ice wedges, release pressure, chemical weathering, abrasions from wind, plant action.
Day 3 - 60 min.
1. Students will research definitions of each glacial feature. The key terms are:
   - Cirques
   - U-shaped valley
   - Snowfield
   - Cirque glacier

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2. Students will then make a model of a mountain landscape illustrating the different glacial features.
   - Pair-up two-person teams for this project.
   - Each team will take a plain white sheet of 11x8 1/2 paper and crumple into a ball.
   - Next partially unravel the paper you crumpled. This serves as your mountain model.
   - Use this model to illustrate a miniature mountain range.

3. Students will find glacial features in their own model.
   - Using the crumpled paper model, locate as many glacial features as you can find created by paper crumpling.

4. Glacier features (color coded)
   - Once you find the glacial features on the paper model, use water colors to identify the feature using the following color code:
     - ◊ Cirques (blue color code),
     - ◊ U-shaped valley(green color code),
     - ◊ Snowfield (red color code),
     - ◊ Cirque glacier (orange color code)

Resources
Internet
www.nps.gov/archive/glac/home.htm
www.glacierparkphotos.com

Ruap, O.B., Earhart, R.L., Whipple, J.W. and Carrara, P.E., 1983, "Geology Along Going to the Sun Road Glacier National Park, Montana"

"Igniting The Sparkle An Indigenous Science Education Model," by Gregory A. Cajete, Ph.D. 1999

Materials/Resources Needed
Computer with Internet access: Used for viewing mechanical weathering and viewing names of mountains.
"Place Names of Glacier National Park," By Jack Holterman, Riverbend Publishing

Mountain Model
- Plain white paper 11x81/2:
- water paints/markers: blue, green, red, orange

Definitions
Cirque = Carved out basin side of a mountain
U-shaped valley = area where glacier slowly moved through as it plows toward lower elevations
Snowfield = Existing glaciers that still currently move, and has an ice base.
Cirque glacier = slopes that still have glaciers within cavity